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**MAR 20 2008**

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**Telefax Transmittal**

**Date:**  
 March 20, 2008

**To / Company / Telefax:**  
 Mail Stop Appeal Brief- Patents / USPTO / 571-273-8300

**From:**  
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**Client / matter code:**  
 12800 / 614  
 DN 102123-200

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<b>In re application of:</b>	Indulis Gruzins Donald Farrell McElheney Robert C. Hirc Jerry Douglas Necessary Joseph T. Farrell 09/996,480	<b>Docket:</b>	102123-200
<b>Serial No.:</b>		<b>Art Unit:</b>	1625
<b>Filed:</b>	November 20, 2001	<b>Examiner:</b>	Taylor V. Oh
<b>Assignee:</b>	Arch Chemicals, Inc.	<b>Conf. No.</b>	3615
<b>Title:</b>	POLYOLS CONTAINING CARBOXYL GROUPS AND PRODUCTION THEREOF		

In connection with the above-mentioned patent application, please verify by return facsimile the receipt of the following documents transmitted herewith:

- Amended Appeal Brief Under §41.37(d) (20 pages)

20 page(s) following this page

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CENTRAL FAX CENTER****MAR 20 2008**Attorney Docketing No. 102123-200  
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In re application of:	Indulis Gruzins Donald Farrell McElheney Robert C. Hire Jerry Douglas Necessary Joseph T. Farrell	Docket:	102123-200
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Title:	POLYOLS CONTAINING CARBOXYL GROUPS AND PRODUCTION THEREOF		

**AMENDED APPEAL BRIEF UNDER §41.37(d)**

Mail Stop Appeal Brief-Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

This Amended Appeal Brief is responsive to the "Notification of Non-Compliant Appeal Brief" dated March 10, 2007, for which, a response is due on or before April 10, 2008.

If there are any charges associated with this Amended Appeal Brief, please charge them to Deposit Account No. 23-1665.

**CERTIFICATE OF MAILING OR TRANSMISSION (37 CFR 1.8(a))**

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- ☐ deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to Inset Mail Stop if Applicable, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.
- ☒ transmitted by facsimile on the date shown below to the United States Patent and Trademark Office via facsimile at (571) 273-8300.

Date: March 20, 2008

Signed:

  
Wanli Wu

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**REAL PARTY INTEREST**

The real party in interest for the above-identified application is Arch Chemicals, Inc.

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**RELATED APPEALS AND INTERFERENCES**

Appellant states that there are no known interferences related to this appeal.

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**STATUS OF CLAIMS**

Claims 1-25, 27-29 and 31, inclusive, are currently pending. Claims 26 and 30 have been canceled. The claims herein appealed are claims 1-25, 27-29 and 31, inclusive. A copy of the presently appealed claims is provided in Appendix I attached hereto.

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**STATUS OF AMENDMENTS**

An Amendment and Reply to a Final Office Action under 37 CFR 1.116 was filed on April 3, 2007. In that Reply, claim 14 was amended to overcome a formal objection under 35 U.S.C. 112, second paragraph. No additional amendments were submitted and no new claims were added.

In an Advisory Action dated April 23, 2007, the objection of claim 14 under 35 U.S.C. 112 was withdrawn. However, the rejection of claims 1-25, 27-29 and 31 under 35 U.S.C. 103(a) was maintained.

A notice of appeal was filed on April 3, 2007.

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### **SUMMARY OF THE CLAIMED SUBJECT MATTER**

Briefly, the present invention relates to a low viscosity carboxyl-containing polyol composition and an amine salt of a carboxyl-containing polyol. The invention further relates to a prepolymer formed by the reaction of a carboxyl-containing monomer of a polyol and a polyisocyanate compound. The present invention also relates to a method of preparing a carboxyl-containing monomer.

As specified in independent claim 1 as shown in Appendix 1, the present invention is directed to a low viscosity carboxyl-containing polyol composition having a viscosity in the range of about 3,000-100,000 centipoise, and having an oligomer content of less than 30 mg KOH/g. This carboxyl-containing polyol is produced by reacting a low molecular weight triol with an acid anhydride in the presence of 5-500 ppm of an organic or inorganic acid catalyst selected from the group consisting of hydrochloric acid, sulfuric acid, nitric acid, formic acid, propionic acid, p-toluenesulfonic acid, oxalic acid, and combinations thereof. The triol compound is selected from the group consisting of glycerol, trimethylolpropane, trimethylolethane, polyether polyols, and combinations thereof. The acid anhydride is selected from the group consisting of maleic anhydride, phthalic anhydride, succinic anhydride, glutaric anhydride, and mixtures thereof.

Support for claim 1 can be found throughout the specification and specifically at p3, lines 30-31, p4, lines 1-2, 6-12, p. 6. lines 4-9, 12-17 and 22-24, as well as p. 7, lines 1-4.

As specified in independent claim 2, the present invention is also directed to a low viscosity carboxyl-containing polyol amine salt. The salt has a viscosity in the range of about 3,000-100,000 centipoise. The salt also has an oligomer content of less than 30 mg KOH/g. The salt is prepared by neutralizing the corresponding carboxyl-containing polyol with an organic amine. The organic amine is selected from the group consisting of: triethylamine, tripropylamine, ethylene diamine, n-butylamine, diethylamine, trimethylamine, monoethanol amine, dimethylethanolamine, aminoalcohols, hydrazine, hexamethylene diamine, isophorone diamine, cyclohexane diamine, dimethylcyclohexylamine, tris(3-aminopropyl)amine, 2-methylpentamethylenediamine, 1,12-dodecanediamine, and combinations thereof.

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Support for claim 2 may be found at p. 9, lines 5-10 and p.13, lines 15-20.

Furthermore, as specified in independent claim 13, the present invention is also directed to a method of preparing a carboxyl-containing monomer. The method includes the step of combining a low molecular weight polyol compound and an acid anhydride in the presence of 25-500 ppm of an organic or inorganic acid. The polyol compound is selected from the group consisting of glycerol, trimethylolpropane, trimethylolethane, polyether polyols, and combinations thereof. The acid anhydride is selected from the group consisting of maleic anhydride, phthalic anhydride, succinic anhydride, glutaric anhydride, and mixtures thereof. The organic or inorganic acid is selected from the group consisting of hydrochloric acid, sulfuric acid, nitric acid, formic acid, propionic acid, p-toluenesulfonic acid, oxalic acid, and combination thereof. The formed carboxyl-containing monomer has a viscosity in the range of about 3,000 to about 100,000 cps and having a free oligomer content of less than about 30 mg KOH/g.

Support for claim 13 can be found throughout the specification and specifically at p. 6, lines 4-9, 12-17 and 22-31, as well as p. 7, lines 1-4.

In addition, as specified in independent claim 25, the present invention is also directed to a prepolymer formed by reacting a carboxyl-containing monomer of claim 1 with a polyisocyanate compound. The polyisocyanate compound is selected from the group consisting of diisocyanate, 4,4'-dicyclohexylmethane diisocyanate, isophorone diisocyanate, 1,4'-tetramethylene diisocyanate, 1,10-decamethylene diisocyanate, 1,12-dodecamethylene diisocyanate, toluene-2,4- or 2,6-diisocyanate, 1,5-naphthalene diisocyanates, 4-methoxy-1,3-phenylene diisocyanate, 4-chloro-1,3-phenylene diisocyanate, 2,4'-diisocyanatodiphenyl ether, 5,6-dimethyl-1,3-phenylene diisocyanate, 2,4-dimethyl-1,3-phenylene diisocyanate, 4,4'-diisocyanatodiphenylether, benzidine diisocyanate, 4,4'-diisocyanatodibenzyl, methylene-bis(4-phenylisocyanate), 1,3-phenylene diisocyanate, 4,4'-diphenylmethane diisocyanate, 2,4'-diphenylmethane diisocyanate, hexamethylene diisocyanate, 4,4'-dicyclohexylmethane diisocyanate, 1,12-dodecanediisocyanate, 2,4,4-trimethylhexamethylene diisocyanate, xylylene diisocyanate, tetramethyl-xylylene diisocyanate, polymethylene polyphenyl isocyanate, and



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combinations thereof. The prepolymers formed have a viscosity in the range of about 3,000 to about 100,000 cps.

Claim 25 is supported by the specification at p. 4, lines 21-23, p. 11, lines 24-31, as well as p. 12, lines 1-13.

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**GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

A copy of the presently appealed claims 1-25, 27-29 and 31 is provided in Appendix 1 attached hereto.

Claims 1-25, 27-29 and 31 stand rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Housel et al. (US 6,103,822) in view of Koistinen et al. (WO98/50338) of record.

It is the Examiner's position that it would have been obvious to the skilled artisan in the art to employ Koistinen's et al. hydrochloric acid into the Housel et al. process as an alternative to Housel's et al. tin oxide.

Appellants respectfully submit that this rejection is untenable and should be withdrawn.

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### **THE REFERENCES**

Housel et al. discloses polymeric acid functional polyols which are the reaction product of at least one hydroxyl-terminated polymer and a nonaromatic anhydride. Acid functional polyols according to Housel et al. having the preferred hydroxyl functionality and acid and hydroxyl values can be derived from a reaction of either: (1) a nonaromatic polyanhydride with at least one polymer; or (2) at least one polyol and/or dicarboxylic acid with a component having at least two unhindered functional groups and at least one hindered carboxylic acid functional group. Further, Housel et al. discloses the use of an organometallic catalyst, such as organotin, to control the reaction.

Koistinen et al. discloses a process for manufacturing polyol complex esters. According to the method, a polyol, such as BEPD or NPG, is reacted with mono- and polyvalent acids in the presence of a catalyst to produce a reaction blend containing complex esters. While acid catalysts, such as sulphuric acid and hydrochloric acid are disclosed, the sole catalyst employed in all of the working examples is tin oxide.

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### ARGUMENTS

Appellants' respectfully submit that, contrary to the Examiner's assertion, it would not have been obvious to the skillful artisan in the art to be motivated to employ Koistinen's et al. hydrochloric acid in the Housel et al. process as an alternative to the Housel's et al. tin oxide.

First, it seems quite clear that Housel et al. does not disclose or suggest the use of any acid catalyst in their process. Rather, Housel et al. employs organometallic catalysts, such as organotin and amine catalysts as stated at column 13, lines 11-24 of that reference. The broad reference to the use of "Minor amount of catalysts" appearing at column 8, line 1 of the Housel et al. cannot be taken to suggest that any catalysts will work when in fact the reference fails to disclose any specific catalysts or class of catalysts other than those within the class identified as organometallic. Certainly, one skilled in this art would not be motivated to try a catalyst other than an organometallic catalyst from the teachings of this reference. The use of any catalyst is disclosed as "optional" by Housel et al. and the working examples of this reference fail to disclose the use of a catalyst in the preparation of the acid functional polyols that are disclosed. Housel refers at page 8, lines 3 to 9 to the problems associated with catalysts in the statement "If the reaction, through the use of certain catalysts or a temperature which is too low, occurs too slowly, conversion to an acid functional polyol will take too long. However, if as a result of the use of particular catalysts or a temperature which is too high, the reaction proceeds too quickly, unwanted side reactions, as discussed above, could occur." Housel et al. raises these potential problems, but neither discloses nor suggests any solution. It is submitted that one skilled in the art upon reading this reference would be lead either to use no catalyst at all or only the organometallic catalyst that is disclosed.

Koistinen et al. discloses a process for manufacturing polyol complex esters. According to the method, a polyol, such as BEPD or NPG, is reacted with mono- and polyvalent acids in the presence of a catalyst to produce a reaction blend containing complex esters. More specifically, as disclosed in all of the working examples of Koistinen et al., complex esters of BEPD (2-butyl-2-ethyl-1,3-propanediol) were manufactured by combining BEPD and saturated linear or branched monocarboxylic acid or unsaturated carboxylic acid and diacid. While acid catalysts,

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such as sulphuric acid and hydrochloric acid, are disclosed at page 3 lines 11-19 of the Koistinen et al., the sole catalyst employed in all of the working examples was tin oxide. Furthermore, the high amount of catalyst loading taught at page 3, lines 18-19 of this reference, and in the working examples, teach away from the instantly claimed range.

One of ordinary skill in the art, reviewing the reaction disclosed in Housel et al. and taking into account the statement concerning potential catalyst problems, would not stray from the teaching set forth in Housel et al. and therefore would not be motivated to combine the disclosure of Housel et al. with the disclosure of Koistinen et al. Specifically, one of ordinary skill in the art would not be motivated to deviate from Housel et al. by using a catalyst that is from a disparate class than one discussed in the specification if indeed any catalyst is employed in light of the negative consequences disclosed in this reference. Therefore, one of ordinary skill in the art would not look to Koistinen et al. to modify the catalyst used in Housel et al.

Furthermore, Applicants submit that even if one of ordinary skill in the art looked to Koistinen et al. to modify Housel et al., tin oxide would be used as a catalyst since tin oxide was specified as the catalyst utilized in all of Koistinen's working examples.

Koistinen et al. alludes to several specific catalysts and classes of catalysts at page 3, lines 15-19 thereof, without disclosing a preference for any particular catalyst. The working examples employ tin oxide at a high 0.15 weight percent loading based on the reaction components. This loading level is three times the maximum amount claimed in instant claim 1.

Indeed, the range of catalyst amounts disclosed at page 3, lines 16 to 18 of Koistinen et al. translates to 500 to 5,000 ppm, a range that is not suggestive of the instantly claimed range.

Accordingly, the combined teachings of Koistinen et al. with Housel et al. would teach in favor of tin oxide to be used at a loading level above that instantly claimed for the Markush group of acid catalysts.

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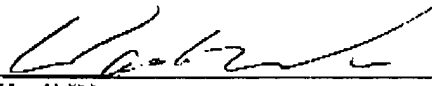
**CONCLUSION**

In conclusion, the combination of Housel et al. and Koistinen et al. does not support a prima facie case of obviousness under 35 USC 103(a) with respect to the instant claims.

Appellant respectfully requests that the Board of Appeals reverse the outstanding rejections under 35 U.S.C. § 103(a) of instant claims 1-25 and 27-31 on appeal. Any fees due with this Reply may be charged to Deposit Account 23-1665 under Customer Number 27267.

Respectfully submitted,  
Indulis Gruzins et al.

Date: March 20, 2008

  
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## APPENDIX I - CLAIMS APPENDIX

### **Complete Listing of Claims:**

1. A low viscosity carboxyl-containing polyol composition having a viscosity in the range of about 3,000-100,000 centipoise, and having an oligomer content of less than 30 mg KOH/g, said polyol being produced by reacting a low molecular weight triol with an acid anhydride in the presence of 5-500 ppm of an organic or inorganic acid catalyst, selected from the group consisting of hydrochloric acid, sulfuric acid, nitric acid, formic acid, propionic acid, p-toluenesulfonic acid, oxalic acid, and combination thereof, said triol compound is selected from the group consisting of glycerol, trimethylolpropane, trimethylolethane, polyether polyols, and combinations thereof, and said acid anhydride is selected from the group consisting of maleic anhydride, phthalic anhydride, succinic anhydride, glutaric anhydride, and mixtures thereof.
2. A low viscosity carboxyl-containing polyol amine salt having a viscosity in the range of about 3,000-100,000 centipoise, and having an oligomer content of less than 30 mg KOH/g, said carboxyl being neutralized with an organic amine to provide said carboxyl-containing polyol amine salt, wherein said organic amine is selected from the group consisting of: triethylamine, tripropylamine, ethylene diamine, n-butylamine, diethylamine, trimethylamine, monoethanol amine, dimethylethanolamine, aminoalcohols, hydrazine, hexamethylene diamine, isophorone diamine, cyclohexane diamine, dimethylcyclohexylamine, tris(3-aminopropyl)amine, 2-methylpentamethylenediamine, 1,12-dodecanediamine, and combinations thereof.
3. A method for producing the carboxyl-containing polyol of claim 1 comprising reacting a low molecular weight triol with an acid anhydride in the presence of 5-500 ppm of an organic or inorganic acid catalyst.
4. The method of claim 1 wherein said organic or inorganic acid is selected from the group consisting of hydrochloric acid, sulfuric acid, nitric acid, formic acid, propionic acid, p-toluenesulfonic acid, oxalic acid, and combinations thereof.

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5. The carboxy-containing monomer of claim 3, wherein said triol compound is selected from the group consisting of glycerol, trimethylolpropane, trimethylolethane, polyether polyols, and combinations thereof.
6. The carboxy-containing monomer of claim 1, wherein said acid anhydride is selected from the group consisting of maleic anhydride, phthalic anhydride, succinic anhydride, glutaric anhydride, and mixtures thereof.
7. The carboxy-containing monomer of claim 1, wherein said carboxyl-containing monomer is made in the presence of 50-250 ppm of said organic or inorganic acid.
8. The carboxy-containing monomer of claim 7, wherein said carboxyl-containing monomer is made in the presence of 100-200 ppm of said organic or inorganic acid.
9. The carboxy-containing monomer of claim 1, wherein said viscosity of said carboxyl-containing monomer ranges from 3,000 to 50,000 cps.
10. The carboxy-containing monomer of claim 9, wherein said viscosity of said carboxyl-containing monomer ranges from 3,000 to 20,000 cps.
11. The carboxy-containing monomer of claim 1, wherein said free oligomer content of said carboxyl-containing monomer ranges from about 2 to 30 mg KOH/g.
12. The carboxy-containing monomer of claim 11, wherein said free oligomer content of said carboxyl-containing monomer ranges from about 2 to 20 mg KOH/g.
13. A method of preparing a carboxyl-containing monomer comprising the step of combining a low molecular weight polyol compound selected from the group consisting of glycerol, trimethylolpropane, trimethylolethane, polyether polyols, and combinations thereof, and an acid anhydride selected from the group consisting of maleic anhydride, phthalic anhydride, succinic anhydride, glutaric anhydride, and mixtures thereof in the presence of 25-500 ppm of an organic or inorganic acid, selected from the group consisting of hydrochloric acid, sulfuric acid, nitric acid, formic acid, propionic acid, p-toluenesulfonic acid, oxalic acid,



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and combination thereof, to produce said carboxyl-containing monomer, said carboxyl-containing monomer having a viscosity in the range of about 3,000 to about 100,000 cps and having a free oligomer content of less than about 30 mg KOH/g.

14. The method of claim 13, wherein said low molecular weight polyol compound has from two to four hydroxyl groups

15. The method of claim 14, wherein said low molecular weight polyol compound is a triol compound possessing three hydroxyl groups.

16. The method of claim 15, wherein said triol compound is selected from the group consisting of glycerol, trimethylolpropane, trimethylolethane, polyether polyols, and combinations thereof.

17. The method of claim 16, wherein said low molecular weight polyol compound is a polyether triol.

18. The method of claim 13, wherein said acid anhydride is selected from the group consisting of maleic anhydride, phthalic anhydride, succinic anhydride, glutaric anhydride, and mixtures thereof.

19. The method of claim 13, wherein said carboxyl-containing monomer is made in the presence of about 50-250 ppm of said organic or inorganic acid.

20. The method of claim 19, wherein said carboxyl-containing monomer is made in the presence of an organic or inorganic acid selected from the group consisting of hydrochloric acid, sulfuric acid, nitric acid, formic acid, propionic acid, p-toluenesulfonic acid, oxalic acid, and combinations thereof.

21. The method of claim 13, wherein said viscosity of said carboxyl-containing monomer ranges from about 3,000 to 50,000 cps.

22. The method of claim 21, wherein said viscosity of said carboxyl-containing monomer ranges from about 3,000 to 20,000 cps.

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23. The method of claim 13, wherein said free oligomer content of said carboxyl-containing monomer ranges from about 2 to 30 mg KOH/g.

24. The method of claim 23, wherein said free oligomer content of said carboxyl-containing monomer ranges from about 2 to 20 mg KOH/g.

25. A prepolymer being the reaction product of (1) the carboxyl-containing monomer of claim 1, and (2) a polyisocyanate compound selected from the group consisting of diisocyanate, 4,4'-dicyclohexylmethane diisocyanate, isophorone diisocyanate, 1,4'-tetramethylene diisocyanate, 1,10-decamethylene diisocyanate, 1,12-dodecamethylene diisocyanate, toluene-2,4- or 2,6-diisocyanate, 1,5-naphthalene diisocyanates, 4-methoxy-1,3-phenylene diisocyanate, 4-chloro-1,3-phenylene diisocyanate, 2,4'-diisocyanatodiphenyl ether, 5,6-dimethyl-1,3-phenylene diisocyanate, 2,4-dimethyl-1,3-phenylene diisocyanate, 4,4'-diisocyanatodiphenylether, benzidine diisocyanate, 4,4'-diisocyanatodibenzyl, methylene-bis(4-phenylisocyanate), 1,3-phenylene diisocyanate, 4,4'-diphenylmethane diisocyanate, 2,4'-diphenylmethane diisocyanate, hexamethylene diisocyanate, 4,4'-dicyclohexylmethane diisocyanate, 1,12-dodecanediisocyanate, 2,4,4-trimethylhexamethylene diisocyanate, xylylene diisocyanate, tetramethyl-xylylene diisocyanate, polymethylene polyphenyl isocyanate, and combinations thereof, said prepolymer having a viscosity in the range of about 3,000 to about 100,000 cps.

26. (Canceled)

27. A prepolymer being the reaction product of (1) carboxyl-containing polyol amine salt of claim 2, and (2) a polyisocyanate compound, said prepolymer having a viscosity in the range of about 3,000 to about 100,000 cps.

28. The prepolymer of claim 27, wherein said polyisocyanate compound is selected from the group consisting of diisocyanate, 4,4'-dicyclohexylmethane diisocyanate, isophorone diisocyanate, 1,4'-tetramethylene diisocyanate, 1,10-decamethylene diisocyanate, 1,12-dodecamethylene diisocyanate, toluene-2,4- or 2,6-diisocyanate, 1,5-naphthalene diisocyanates, 4-methoxy-1,3-phenylene diisocyanate, 4-chloro-1,3-phenylene diisocyanate, 2,4'-

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diisocyanatodiphenyl ether, 5,6-dimethyl-1,3-phenylene diisocyanate, 2,4-dimethyl-1,3-phenylene diisocyanate, 4,4'-diisocyanatodiphenylether, benzidine diisocyanate, 4,4'-diisocyanatodibenzyl, methylene-bis(4-phenylisocyanate), 1,3-phenylene diisocyanate, 4,4'-diphenylmethane diisocyanate, 2,4'-diphenylmethane diisocyanate, hexamethylene diisocyanate, 4,4'-dicyclohexylmethane diisocyanate, 1,12-dodecanediisocyanate, 2,4,4-trimethylhexamethylene diisocyanate, xylylene diisocyanate, tetramethyl-xylylene diisocyanate, polymethylene polyphenyl isocyanate, and combinations thereof.

29. A water-borne polyurethane polymer, said water-borne polyurethane polymer being the reaction product of (1) the prepolymer of claim 25, and (2) an amine compound, wherein said amine compound is selected from the group consisting of: triethylamine, tripropylamine, ethylene diamine, n-butylamine, diethylamine, trimethylamine, monoethanol amine, dimethylethanolamine, aminoalcohols, hydrazine, hexamethylene diamine, isophorone diamine, cyclohexane diamine, dimethylcyclohexylamine, tris(3-aminopropyl)amine, 2-methylpentamethylenediamine, 1,12-dodecanediamine, and combinations thereof.

30. (Canceled)

31. A prepolymer combination comprising the prepolymer of claim 25 and the prepolymer of claim 27.

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**APPENDIX II - EVIDENCE APPENDIX**

*None*

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**APPENDIX III - RELATED PROCEEDINGS APPENDIX**

*None*

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